WHAT IS CLAIMED IS:

1. An ejector for pumping a fluid by entrainment of a high-speed fluid, the ejector comprising:

a nozzle including a fluid outlet port from which the high-speed fluid is jetted, and a nozzle tapered section located at an upstream side of the fluid outlet port, wherein the nozzle tapered section has an inner passage with a radial dimension reduced toward the fluid outlet port; and

a needle having a needle tapered section disposed in the inner passage, wherein:

the needle tapered section has a cross sectional area reduced toward a downstream end of the needle;

the downstream end of the needle is positioned at a downstream side with respect to the fluid outlet port; and

the nozzle tapered section has a taper angle ($\phi 1$) which is equal to or larger than a taper angle ($\phi 2$) of the needle tapered section.

2. The ejector according to claim 1, wherein:

the nozzle further includes a straight section extending from the fluid outlet port to an upstream side by a predetermined distance;

the straight section has an inner radial dimension that is substantially constant;

the straight section is arranged at a direct downstream side of the nozzle tapered section;

the needle is disposed in the nozzle to define a fluid

passage therebetween, and the fluid passage has a throttle section at which a cross-sectional area of the fluid passage becomes smallest; and

the straight section and the nozzle tapered section are connected to each other at the throttle section.

3. The ejector according to claim 1 wherein:

the needle tapered section includes a root section, and an end section located downstream of the root section; and

the end section has a taper angle ($\varphi 1$) that is different from a taper angle ($\varphi 2$) of the root section.

4. The ejector according to claim 1 wherein:

the needle tapered section includes a root section, and an end section located downstream of the root section; and

the end section has a taper angle ($\varphi 1$) that is smaller than the taper angle ($\varphi 2$) of the root section.

5. The ejector according to claim 1, wherein the needle tapered section has a downstream end surface that is formed in one of a substantially hemispherical shape and a flat shape.

6. The ejector according to claim 1, further comprising an actuator for displacing the needle in an axial direction of the needle.

7. The ejector according to claim 1, further comprising a housing for defining at least a mixing portion in which the fluid is drawn by the entrainment of the high-speed fluid jetted from the fluid outlet port to be mixed with the high-speed fluid.

8. An ejector for pumping a fluid by entrainment of a high-speed fluid, the ejector comprising:

a nozzle including

a fluid outlet port from which the high-speed fluid is jetted,

a straight section extending from the fluid outlet port to an upstream side by a predetermined distance, and having an inner radial dimension that is substantially constant, and

a nozzle tapered section located at an upstream side of the straight section, wherein the nozzle tapered section has an inner passage with a radial dimension reduced toward the straight section; and

a needle having a needle tapered section that has a cross sectional area reduced toward a downstream end of the needle, wherein:

the needle is disposed in the nozzle to define a fluid passage therebetween, and the fluid passage has a throttle section at which a cross-sectional area of the fluid passage becomes smallest;

the straight section and the nozzle tapered section are connected to each other at the throttle section;

the needle has a downstream end that is positioned at a downstream side with respect to the throttle section; and

the nozzle tapered section has a taper angle ($\phi 1$) which is equal to or larger than a taper angle ($\phi 2$) of the needle tapered section.

9. A vapor compression refrigerant cycle comprising:

a compressor for compressing refrigerant;

a radiator for cooling high-pressure refrigerant discharged from the compressor;

an ejector having a nozzle for decompressing the high-pressure refrigerant from the radiator;

an evaporator for evaporating a low-pressure refrigerant after being decompressed; and

a gas-liquid separator for separating refrigerant discharged from the ejector into gas refrigerant and liquid refrigerant, the gas-liquid separator including a gas-refrigerant outlet coupled to a refrigerant suction side of the compressor and a liquid refrigerant outlet coupled to an inlet side of the evaporator, wherein:

the ejector includes

a nozzle including a nozzle tapered section that has an inner passage with a radial dimension reduced toward a nozzle outlet port from which high-speed refrigerant is jetted,

a needle having a needle tapered section disposed in

the inner passage, the needle tapered section having a cross sectional area reduced toward a downstream end of the needle, and

a pressure increasing portion in which gas refrigerant from the evaporator is drawn by entrainment of the high-speed refrigerant jetted from the nozzle outlet port, wherein:

the downstream end of the needle is positioned at a downstream side with respect to the nozzle outlet port; and

the nozzle tapered section has a taper angle ($\phi 1$) which is equal to or larger than a taper angle ($\phi 2$) of the needle tapered section.

10. The ejector according to claim 9, wherein:

the nozzle further includes a straight section extending from the fluid outlet port to an upstream side by a predetermined distance;

the straight section has an inner radial dimension that is substantially constant;

the straight section is arranged at a direct downstream side of the nozzle tapered section;

the needle is disposed in the nozzle to define a fluid passage therebetween, and the fluid passage has a throttle section at which a cross-sectional area of the fluid passage becomes smallest; and

the straight section and the nozzle tapered section are connected to each other at the throttle section.